racters indicated by the presence or absence of the carina, it is almost impossible to recognise in the sternum any of those distinguishing features which may be stated in a single word, or may be incorporated as a definition in any tabular arrangement. The sternums of most birds, even those which are most peculiar, must be considered in their entirety, and a complete description is necessary for their differentiation." We would feel disposed to go even further than this, and to say that in the sternum there are characters from which, with a little extraneous assistance, more considerable generalisations may be arrived at. It is true that in the passerine *Pteroptochus* the posterior margin is doubly notched on either side, but in how different a manner from that in the piciform birds and owls! What more than the sternum proves the closeness of the relationship between the Toucans, Woodpeckers, and Capitoes, also between the Swifts and the Humming Birds, as well as the small kinship between the gallinaceous birds and the Sand Grouse? On the other hand, the sternum does not aid us much in the determination of more distant relationships, such as those of families one to the other. From it alone we should not feel justified in placing the Tinamous near the Apteryx, nor the Stormy Petrels near the Fulmars.

In the *Bulletin de la Société Philomathique* and in the *Journal de Zoologie* Dr. Alix has published his dissections of the Rhea and of a Tinamou (*Nothura major*). His myological investigations are based on the descriptions given by Vic d'Azyr and Meckel. Following the latter of these, he mentions that in the Cormorant the ambiens muscle (*accessoire iliaque du fléchisseur perforé*) is absent, which is decidedly not the case in the common species (*Phalacrocorax carbo*). With reference to this bird, the accessory femoro-caudal is said to be represented by an aponeurotic band, which we have failed to detect; and the same remark applies to the muscle itself in the Heron (*Ardea cinerea*), in which it is also said to be developed; from which we may infer that the author has evidently not clearly recognised the characters which distinguish this fleshy fasciculus from the obturator externus (*carré*); and that such is the case is further proved by his statement that the latter named muscle is enormous in the ostrich, in which it is in reality very small, being almost hidden by the former.

The flexor tendons of the toes are specially dwelt on. The flexor perforatus digitorum is shown to present peculiarities sufficiently important to deserve special names. This muscle in birds is not a single one, but is formed of a superficial and a deep group; the latter having two separate origins, an internal and an external, of which the relative proportionate bulks vary. Those birds in which the outer head is the larger are termed *ectomyens;* those with a larger internal head, *entomyens;* and those with equal heads, *homœomyens.* "The palimpeds, the longirostral and pressirostral Waders, the Flamingoes, the Storks, the Tinamous, the struthious birds and the Parrots, are entomyen; the Herons, the Rails, the gallinæ, Pigeons and passeres, are homœomyen; whilst the diurnal and nocturnal birds of prey are ectomyen." The deep flexors are said not to offer such remarkable differences as those just referred to, but as none of their most striking peculiarities are mentioned, we presume that the author is unacquainted with them. The long flexor tendon to the hind toe, we are told, is absent in the swan; it may be so in *Cygnus olor*, such is certainly not the case in *C. nigricollis.*

The last section of the work is almost entirely devoted to the flight of birds, this subject being viewed from a theoretical standpoint only. It is demonstrated in a fairly conclusive manner that the assumption of Borelli, in which the wing is considered to strike directly downwards and to turn backwards simply on account of the yieldingness of its posterior margin, is insufficient to explain the different movements observed; at the same time that it is opposed to the results arrived at from a study of the shape of the articular surfaces of the shoulder, and the arrangement of the fibres of the muscles acting on that joint. This, we think, is the tendency of modern investigation, notwithstanding the support, by M. Marey, of the opposite view. The results of the elaborate investigations of this latter able physiologist are as easily explained upon the one assumption as the other, perhaps better on the anti-Borellian theory, which no doubt is not required to account for the movements of the wings in the much less intricate problem of insect flight.

The following are Dr. Alix's propositions on this subject:—"*First.* The wing in the down-stroke begins by moving forward to attain its basis of support; after which it strikes briskly from above downwards, and at the same time from before backwards, as a result of which the bird is projected forwards. *Second.* At the moment at which the wing commences to descend, its lower surface looks forwards; but as it descends, this surface gradually turns to look directly downwards, and ultimately more and more backwards. *Third.* During the ascent of the wing, it moves upward and forward, its inferior surface at the same time looking forward." The nearly complete agreement of these observations with the results of M. Marey's previously published experiments is worthy of note, considering the differences in the starting-points of the two authors. The question of avian locomotion, as it now stands, is therefore not so much as to what are the positions of the wing during the different parts of the stroke, but as to whether the variations in the direction of its plane depend for their origin on the movements imparted to the humerus by the muscles acting on the shoulder, or on the influence of the resisting air upon a vertically moving plane which is more yielding behind than in front. This question requires further elucidation, though, as we have just remarked, we think, with Dr. Alix, that the balance of evidence is considerably in favour of the former view.

In conclusion, we strongly recommend this complete and able exposition of the locomotor apparatus of birds to all students both of physiology as well as of zoology.

"THE ABODE OF SNOW"

The Abode of Snow. Observations on a Journey from Chinese Tibet to the Indian Caucasus, through the upper valleys of the Himalayas. By Andrew Wilson. (Edinburgh and London: W. Blackwood and Co., 1875.)

LAST week we noticed Mr. Drew's almost exhaustive work on Jummoo and Kashmir; Mr. Wilson's work is to a large extent concerned with the same region, as

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the greater part of the journey recorded was through Kashmirian territory. But the two works differ in many respects in design and plan. Mr. Drew has brought together so full and trustworthy a mass of information of all kinds about Kashmir as must render his work the great authority on the subject for a long time to come; his style is perfectly plain and unadorned; nearly every sentence is a positive statement of fact; he does not spend many words in admiration of the unparalleled scenery in the midst of which he lived for ten years, and he is never tempted into rapture. The attraction of Mr. Drew's work, and it is distinctly attractive, lies in the high interest and value and frequent novelty of the information contained in it. Mr. Wilson's aim, on the other hand, is to enable the reader to share, as far as words can go, the sensations which he himself felt in journeying for weeks in the midst of scenery whose grandeur cannot be adequately expressed, to present an impressive panoramic view of the "peaks, passes, and glaciers," and the fearful ravines of the highest mountains in the world, and to picture the scanty life which lurks in their lofty valleys or clings to their steep and rugged sides. His work is written, he tells us, "for those who have never seen and may never see the Himalaya. I have sought," he says, "to enable such readers in some degree to realise what these great mountains are, what scenes of beauty and grandeur they present, what is the character of the simple people who dwell among them, and what are the incidents the traveller meets with, his means of conveyance, and his mode of life?" Mr. Wilson has accomplished this task as successfully as it is possible to do it by means of language. Without apparent effort or artifice the current of his narrative flows on with delightful sweep; his style is vigorous, clear, and really eloquent, never bombastic or stilted, and with an under-current of genuine humour. He follows the only scientific method of reproducing in his readers the impressions made upon himself by the Himalayan scenery—by representing in simple but striking language the features which stirred his admiration and awe, never indulging in those futile and vague expressions of ecstasy which are a mark of the feeble observer, unscientific thinker, and unskilled writer. At the same time Mr. Wilson manages to convey a very considerable amount of information, and whoever reads his work with care will have realised to some extent the character of the region which it attempts to describe.

Mr. Wilson's main object in undertaking his toilsome tour among the Western Himalayas was to invigorate a constitution prostrated by the trying climate of India. His original intention was simply to visit Masuri and Simla, "but the first glimpse of the Jumnotri and Gangotri peaks excited longings which there was no need to restrain," and he plunged into the heart of the Himalayas. His journey lasted from June to November 1873. His real starting-point was Simla, though he gives valuable information as to other routes, and makes many shrewd comments on the men and manners of the various places through which he passed before reaching this point, on society and politics, and on certain burning questions connected with our Indian Empire. From Simla he proceeded up the stifling valley of the Sutlej to Shipki, where he made a vain attempt to get into Chinese Tibet; he was worsted by the women of the place. Hence he proceeded in a generally north-west direction by the Lee River, through the Schinkal pass, past Padam in Zanskar, to Dras, visiting Sirinagar and the Vale of Kashmir, and on westwards by the Jhelam River to the Khyber Pass. This is easily told, but the difficulties Mr. Wilson had to encounter are almost incredible, especially when it is considered that he was an invalid in search of health; for a month he was laid up at Pu, not far north from Simla, by an attack which nearly proved fatal. He camped out nearly all the time, had frequent difficulty in procuring provisions for himself and his small retinue, had often to scramble along paths not much broader than a mantelshelf, overhanging ravines many thousands of feet deep, had to risk being lost in glaciers and frozen to death on passes upwards of 16,000 feet high. He bore it all with infinite good humour, and reached the Khyber Pass, we have no doubt, a stronger and a wiser, and quite as cheerful a man as when he started from Simla.

Mr. Wilson's work, as we have hinted, is something more than a fascinating tale of travel. While he gave himself up unrestrainedly to the scenic influences in the midst of which he sojourned for five months, he was quite alive to all the principal features of interest which presented themselves. There are frequent references to the animal and vegetable life of the region, to its grand physical and geological phenomena, and especially to the characteristics of the interesting people who inhabit the not infrequent villages on the route. He has added something to our knowledge of the glaciers of this part of the Himalayas. Mr. Wilson had several opportunities of observing closely the life of the people, and the information he gives will be found of value even by those who are familiar with the literature of the subject. He speaks, as might be expected, at considerable length on the polyandry and Lamaism which prevail over a considerable part of his route, and his remarks are characterised by great moderation and good sense. We wish we had space to quote the exquisite picture of domestic life which Mr. Wilson witnessed while snowed up at the village of Phe, in Zanskar. He seriously suggests the possibility of the Turanian Zanskaris being "congeners of the Celtic race."

He tells us a good deal, of course, about the Vale of Kashmir, and, like Mr. Drew and other geologists, concludes that it was at one time, and that not very remote, a great lake; he enters into some interesting speculations on the prehistoric inhabitants and condition of Kashmir. When near the end of his journey he made a bold raid across the Afghan frontier, and has a chapter on Afghan ethnology and the Afghan character.

In a chapter written under the influences of a moonlight midnight among the Himalayas—and how awe-inspiring and "other-worldly" such influences must be, one can easily imagine—Mr. Wilson indulges in some curious speculations on the struggle for life in the organic, and especially in the animal world, as contrasted with the inorganic. We think he has struck quite a wrong key here, and has not an adequate grasp of the facts of the case; but even if we had space we could not enter into his argument, as it is mixed up with certain subjects that are beyond the sphere of NATURE.

"The Abode of Snow" will, we believe, take its place as one among the few of our really classic works of travel.

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